Piecewise Functions

- A function defined by multiple sub-functions, each sub-function applying to a certain interval of the main function's domain (called a subdomain)
- The pieces can be any type of function; try using transformations to graph
- Use open/closed circles to indicate if endpoints are included in the domain
- Can be continuous or discontinuous

Example 1 Evaluating Piecewise Functions

Determine which piece is used based on the domain restrictions given. Substitute x into that piece and evaluate for y.

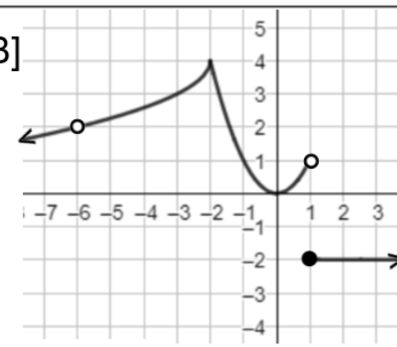
A] $f(x) = \begin{cases} x+4, x < -2 \\ \frac{1}{2}x^2, -2 \le x \le 2 \\ -2\sqrt{x-2}+1, x > 2 \end{cases}$

$f(6) =$

$f(-12) =$

$f\left(\frac{3}{2}\right) =$

B]



$f(-2) =$

$f(-6) =$

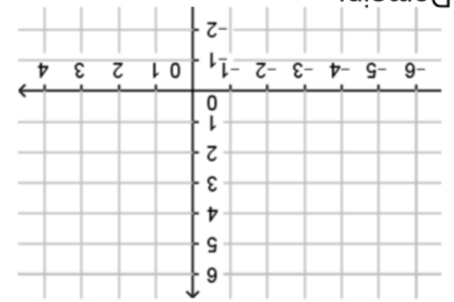
$f(0) =$

$f(1) =$

Example 2 Graphing Piecewise Functions

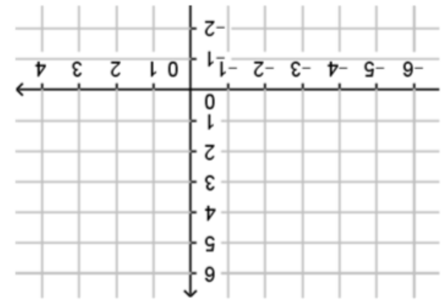
Graph one piece (using pencil) and erase the parts not in the domain.
Determine any open/closed circles based on the domain.
Repeat for each piece of the function.

A] $y = \begin{cases} x+3, x < -1 \\ -x^2+3, x > -1 \end{cases}$



Domain:
Range:

B] $y = \begin{cases} -|x+1|+4, x \le 1 \\ 3, 1 < x \le 2 \\ 2x-4, x > 2 \end{cases}$



Domain:
Range:

Example 3 Characteristics of Piecewise Functions

To find the **y-int** (0,y):

1] Find the subfunction where x=o works in the subdomain

2] Substitute 0 for x in that subfunction and evaluate

To find the **zeros** (x,0):

1] Set each subfunction equal to zero and solve for x

2] Check the zeros for each subfunction in its subdomain. If it is restricted from the domain, it is extraneous.

A] $y = \begin{cases} x+3, x < -1 \\ -x^2+3, x > -1 \end{cases}$

y-int:

Zero(s):

B] $y = \begin{cases} -|x+1|+4, x \le 1 \\ 3, 1 < x \le 2 \\ 2x-4, x > 2 \end{cases}$

y-int:

Zero(s):

Example 4 Writing Equations of Piecewise Functions Given a Graph